THREE MILE ISLAND NUCLEAR STATION, UNIT 2
DRAFT ENVIRONMENTAL TECHNICAL SPECIFICATIONS

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THREE MILE ISLAND NUCLEAR STATION UNIT 2
ENVIRONMENTAL TECHNICAL SPECIFICATIONS
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Procedures Manual

Benthic Macroinvertebrates

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Tabular Locations of Sampling Stations

Map Locations of Sampling Stations

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1.C DEFINITIONS

Annually

Annually is once every twelve calendar months, plus or minus one month.

Composite Sample

A combination of individual samples obtained at regular intervals over a time period. Either the volume of each individual sample is proportional to the discharge flow rates, or the sampling is proportional to the flow rates over the time period used to produce the composite.

Daily Average Concentration

Daily average concentration means the arithmetic average of all daily determinations of concentration made during a calendar month. Daily determinations of concentration using a composite sample shall be the concentration of the composite sample. When grab samples are used, the daily determination of concentration shall be the arithmetic average of all the samples collected during that calendar day.

Daily Maximum Concentration

Daily maximum concentration means the daily determination of the maximum concentration recorded for any calendar day.

Functional Test

A functional test shall be the injection of a simulated signal into the channel as close to the primary sensor as practicable to verify operability including alarm and/or trip functions.

Gamma Scan (Gamma Spectroscopy)

A gamma scan is identification of gamma emitting isotopes, using a multichannel analyzer and a solid state detector.

Grab Sample

A grab sample is an individual sample collected in less than fifteen minutes.

Indicator Station

An indicator station is a sample location where adverse environmental effects resulting from station operation could be perceived.

Instrument Check

An instrument check is a visual inspection of a monitor readout.

Lake Frederic

Formerly York Haven Reservoir.

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Monthly

Monthly is once every calendar month, plus or minus one week.

NPDES Permit

NPDES Permit is the National Pollutant Discharge Elimination System Permit No. PA 0009920 issued by the Environmental Protection Agency to Metropolitan Edison Company. This permit authorizes Metropolitan Edison Company to discharge from TMINS, controlled waste water into the waters of the Commonwealth of Pennsylvania.

Quarterly

Quarterly is once every three calendar months, plus or minus two weeks.

Semi-Monthly

Semi-monthly is every one-half calendar month, plus or minus four days.

Station and Unit

Station refers to TMI Units 1 and 2. Unit refers only to TMI-1 or TMI-2, as defined by its usage. Reference to specific instrumentation will be indicated by placing each unit's instrument number in parenthesis, Unit 1 proceeding Unit 2. Only the individual unit's instrument is applicable to specifications applied to that unit.

Weekly

Weekly is once every calendar week, plus or minus two days.

Unusual or Important Events

As specified in Section 5.6.2.a, unusual or important events that cause a significant environmental impact, that affect potential environmental impact from plant(s) operation, or that have public or potential public interest concerning environmental impact from plant(s) operation may include the following: unusual or important bird impaction events on cooling tower structures or meteorological towers; on-site plant or animal disease outbreaks; on-site forest or grass land fires; unusual mortality of any species protected by the Endangered Species Act of 1973; and fish kills near or downstream of the site.

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2.0 Limiting Conditions for Operation

2.1 Thermal

Specification

The condenser cooling system shall operate in closed cycle cooling mode at all times during station operation.

Surveillance Requirement

Inlet and discharge water temperatures shall be measured continuously in accordance with provisions of 40 CFR 136 and logged hourly. Sensors shall be located at the inlet water box of the condenser and at the end of the cooling tower discharge line. Flow rate through the cooling towers shall be estimated continuously on the basis of pump operation and correlated with reactor power level.

In cases of temperature sensor malfunction, measurements shall be made and logged hourly at the locations specified.

Reporting Requirement

The results of surveillance for the LCO shall be reported in accordance with Table __ of Section 5.6.1.a. Results of the surveillance which indicate a violation of the LCO shall be reported in accordance with Section 5.6.2.a(2).

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Bases

Section 5.3.3 of the Draft Supplement to the FES for Three Mile Island Nuclear Station, Unit 2 endorses the effluent water temperatures stipulated by the NPDES issued by the State of Pennsylvania under FWPCA Sections 302 and 402. This endorsement indicates NRC agreement that plant operation within the limits indicated above will assure no excessive, irretrievable, or irreversible damage to the aquatic environment or to its biotic inhabitants.

2.3 Chemical

2.3.1 pH

Specification

The pH of the discharges from the holding tanks for the demineralizer and condensate polisher regeneration solutions shall be maintained in the range of 6.0 to 9.0 SU.

Discharges from these tanks shall not be initiated if the sampled regeneration solutions in the tanks have a pH outside of the allowed range.

Surveillance Requirement

The contents of the regeneration solution holding tanks shall be grab sampled and the pH measured in accordance with the EPA Guidelines for Establishing Test Procedures for the Analysis of Pollutants, 40 CFR 136. Sampling shall be conducted prior to each release of the contents of the tanks.

Reporting Requirement

The results of the Surveillance for the LCO shall be reported in accordance with Table IV.1 of Section 5.6.1.a. Results of the surveillance which indicate a violation of the LCO shall also be reported in accordance with Section 5.6.2.a.(2).

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Bases

The Limiting Condition of Operation will control the pH of the discharged demineralizer and condensate polisher regeneration solutions within the range necessary for the protection of aquatic biota. The commonwealth of Pennsylvania and the U. S, EPA Region III evaluated the collection, treatment and discharge systems for the demineralizer and condensate polishing regeneration solutions with respect to the Susquehanna River water quality standards and the FWPCA Steam Electric Generating Point Source Category Effluent Guidelines and Standards, respectively. The Commonwealth and EPA have determined, through issuance of the licensee of a water quality certification and NPDES permit PA-0009920 (pursuant to FWPCA Sections 401 and 402, respectively), that these requirements will be met under proposed operation. In the FES, Section 5.3.3, the staff accepted the determinations of the Commonwealth of Pennsylvania and EPA that the maintenance of regeneration tank discharge pH within the ranges of 6.0 to 9.0 SU will not result in unacceptable impact on the receiving water.

Each regeneration of the two stage feed water demineralizers and the condensate polishing demineralizers will produce acidic and caustic solutions of differing characteristics, which will be neutralized on a batch-by-batch basis. Therefore, monitoring the pH of each batch after neutralization but prior to release is necessary to assure compliance with the specified limits.

2.2.2 Biocide

Specification

The concentration of free residual chlorine in the plant discharge shall not exceed a monthly average value of 0.2 mg/l nor an instantaneous maximum value of 0.5 mg/l.

If sampling indicates that these limits are being exceeded, the addition of chlorine shall be terminated immediately. The biocide application program shall be reviewed by plant personnel and modified as necessary to comply with the above limits prior to the resumption of chlorination of the system involved.

Surveillance Requirement

The plant discharge line shall be grab sampled and analyzed for free residual chlorine in accordance with the EPA Guidelines for Establishing Test Procedures for the Analysis of Pollutants, 40 CFR 136. Sampling shall be done on a once per week basis, with a minimum sampling interval of 3 days, during chlorination at a time when the maximum free chlorine residual is expected at the plant discharge.

All weekly values determined during a calendar month shall be arithmetically averaged to determine compliance with the specified monthly average limit.

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Reporting Requirement

The results of the surveillance conducted for this LCO shall be reported in accordance with Table of Section 5.6.1.a. For each sample, the licensee shall report the date of the sample, the free residual chlorine concentration measured and the analysis procedure used. The monthly average free residual chlorine concentration shall also be reported for each month. Results of the surveillance which indicate a violation of the LCO shall also be reported in accordance with Section 5.6.2.a.(2).

Bases

This Limiting Condition of Operation will limit the concentration of free residual chlorine in the plant discharge to a level consistent with that of the NPDES Permit.

The U. S. Environmental Protection Agency Region III has issued the licensee NPDES Permit No. PA-0009920 as a result of an evaluation of the operation of the plant against the promulgated EPA Steam Electric Generating Point Source Category Effluent Guidelines and Standards dated October 8, 1974.

This evaluation resulted in the adoption of the aforementioned Guideline level for a residual chlorine limit in the plant discharge to the Susquehanna River. The EPA Effluent Guidelines only restrict the free residual chlorine concentration in the effluent and not the total residual chlorine concentration.

Based on the provisions of the Second Memorandum of Understanding, the NRC will not impose more stringent limitations on a licensee as a provision of any license than those limitations established pursuant

to authority under the Federal Water Pollution Control Act Amendments of 1972 (see FES Supplement, Section 5.3.3). Therefore, the staff has incorporated the NPDES concentration limits and the monitoring frequency as part of these ETS.

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3.0 Environmental Surveillance

3.1 Nonradiological Surveillance

3.1.1 Abiotic

a. Aquatic

3.1.1.a (1) Plant Chemical Releases

Specification

The total residual chlorine concentration of the plant discharges shall be measured.

Surveillance Requirement

When chlorination is being practiced at the plant, the plant discharge shall be grab sampled at the outfall on a weekly basis corresponding to the sampling conducted under ETS 2.3.2 and analyzed for total residual chlorine as allowed by the EPA Guidelines Establishing Test Procedures for the Analysis of Pollutants 40 CFR 136.

This surveillance program shall commence with the initial application and discharge of residual chlorine to Unit 2 cooling systems and continue for the life of the station or until approval for termination or modification is obtained from NRC.

Reporting Requirement

The results of the surveillance conducted under this program shall be reported in accordance with Section 5.6.1.a. For each measurement, the date of analysis, total residual chlorine concentration, and method of analysis used shall be recorded.

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A non-routine report as specified in Section 5.6.2.a.(2) shall be made for any measurement of total residual chlorine in excess of 0.2 mg/l.

Bases

Chlorination of plant cooling water systems is permitted with controls only on the free chlorine residual fraction of the discharge. Toxicity to aquatic biota occurs from both the free and combined residual chlorine fractions. Therefore, a measure of the potential toxicity of the plant discharge is the measure of total residual chlorine. This surveillance program will provide information on the magnitude of the total residual chlorine concentration in the plant discharge during plant chlorination to determine if concentrations harmful to other water users are present. An effluent limit for protection of warm water fish species to intermittent chlorine exposure of 0.2 mg/l total residual chlorine has been suggested by Brungs (1973), EPA (Tebo, 1975) and Basch and Truchan (1974).

In the environmental statement, Section 5.3.3, it was recognized that chlorination of plant systems at the level permitted by the NPDES Permit could lead to discharge of total residual chlorine values up to 3 times the measured values for free residual chlorine. Past experience was also cited, stating that total residual chlorine values did not often exceed 0.2 mg/l.

Monitoring total residual chlorine in the plant effluent at the same time as free residual chlorine measurements for ETS 2.3.2 will provide necessary information on the relationship between the residual chlorine fractions. This will allow a comparison with the previous operating history at the site and a confirmation of the predictions of FES Section 5.5.3.

The establishment of the specified report level will also alert the staff to toxic conditions in the vicinity of the plant outfall and to unanticipated operating conditions at the plant.

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3.1.1.a(2) Water Quality Analysis

Specification

Information on the physical and chemical characteristics of the Susquehanna River at the times and sampling locations for the General Ecological Survey of ETS Section 3.1.2.a(1) shall be collected in the vicinity of the TMI station.

Surveillance Requirements

The following physical and chemical characteristics of the Susquehanna River shall be measured:

Temperature
Turbidity
pH
Alkalinity
Dissolved Oxygen
Total Dissolved Solids
Copper (total and dissolved)
Zinc (total and dissolved)
Sulfate

All analyses shall be in accordance with EPA Guidelines Establishing Test Procedures for the Analysis of Pollutants, 40 CFR 136.

The sampling of these parameters shall be conducted on a monthly basis (conditions permitting) with a minimum sampling interval of 10 days. The collection of samples shall coincide to the extent practicable with biological sampling at the same location. Grab samples for the above parameters shall be collected at the stations indicated in Table 3.1-2 (station locations are shown on Figure 3.1-1) and at Station 5 (TM-LF-12A1) indicated on Figure 3.1-4.

The licensee shall indicate for each parameter the date of sampling, the sampling location, the concentration measured, depth of sample, and method of analysis used.

This surveillance program shall commence at initial criticality of Unit 2 and shall continue for the life of the station or until approval for termination or modification of the program is obtained from the NRC.

Reporting Requirement

The results of the surveillance conducted under this program shall be reported in accordance with Section 5.6.1.

Bases

The environmental assessments, as defined in the FES-OL of 1972 (Section V.C.2) and the Supplement to the FES-OL of 1976 (Section 5.5.2) determined that impacts to aquatic biota of the Lake Frederick area of the Susquehanna River may result from the operation of Three Mile Island Nuclear Station.

Examination of the water quality, at the times and locations used for the aquatic biological investigations during plant operation will yield data useful in evaluation of trends and unusual occurrences.

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3.1.1.a(3) Chemical Release Inventory

Specification

The licensee shall document the types. amounts, duration and timing of chemical discharges from the plant to the receiving waters.

Surveillance Requirements

From plant inventory and operating records, the licensee shall tabulate the usage of all chemicals released through plant systems to the aquatic environment. The tabulation shall indicate the chemical name as used or as released, the system in which the chemical is used, the amount of each chemical used or released, and the number and average duration of each release period for each chemical during the reporting period. Chemical release data shall be summarized over the smallest discrete usage interval practical. Yearly averages shall only be presented for those discharges which were steady and continuous.

This surveillance program shall commence at initial criticality of Unit 2 and shall continue for the life of the plant or until approval for termination or modification of the program is obtained from NRC.

Reporting Requirement

The results of the surveillance conducted under this program shall be reported in accordance with Table IV.2 of Section 5.6.1.a.

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Bases

Documentation of the chemical releases from the Unit will enable the NRC to determine that the facility is being operated, with respect to chemical use and discharge, in the manner evaluated in the Environmental Statement. This program may also assist the NRC in evaluation of unusual occurrences revealed by other programs conducted under these ETS.

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3.1.2 Biotic

3.1.2.a Aquatic

3.1.2.a.(1) General Ecological Survey

3.1.2.a.(1)(a) Benthic Macroinvertebrates

Specification

The benthic macroinvertebrates shall be sampled to detect and assess the significance of changes in species composition, standing crop biomass, distribution, and abundance as related to power station operation. Sampling shall be performed as specified in the Procedures Manual. Methods and materials approved for implementation of this study are provided in the Procedures Manual.

Surveillance Requirements

This surveillance program shall commence at initial criticality of Unit 2 and continue for the life of the station or until approval for termination is obtained from NRC, as per Section 5.6.3.C.

Sampling shall be conducted once per calendar month at approximately 30-day intervals.

Reporting Requirement

Data, program results, and interpretation of environmental impacts shall be reported as per the routine report schedule of Section 5.6.1.B.

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Bases

The environmental assessments, as defined in the FES-OL of 1972 (Section V.C.2) and the Supplement to the FES-OL of 1976 (Section 5.5.2.3) determined that impacts to the benthos of Lake Frederic area of the Susquehanna River may result from the operation of Three Mile Island Nuclear Station. Impacts may occur as a result of thermal additions. Species diversity, composition, and biomass in the immediate site vicinity are most susceptible to thermal alterations, and to changes in sedimentation, turbidity, and dissolved oxygen levels. Suspended solids may also interfere with respiratory processes and decrease light penetration so that the food sources of the benthos may be reduced. Past studies have shown that increased sedimentation may result in increased numbers of some dominant organisms, especially the annelid worm *Limnodrilus hoffmeisteri*.

Since benthic organisms are sedentary and cannot "avoid" adverse conditions, they are useful indicators of water quality.

.1.2.a.(1)(b) Ichthyoplankton

Specification

The ichthyoplankton shall be sampled to detect and assess the significance of changes in species composition, relative abundance,

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density, and seasonal and spatial distribution as related to power station operation. Sampling shall be performed as specified in the Procedures Manual. Methods and materials approved for implementation of this program are provided in the Procedures Manual.

Surveillance Requirement

This surveillance program shall commence at initial criticality of Unit 2 and continue for the life of the station or until approval for termination is obtained from NRC as per Section 5.6.3.C.

Sampling shall be conducted once per week at approximately a 7-day interval, during the period March through July.

Reporting Requirement

Data, program results, and interpretation of environmental impacts shall be reported as per the routine report schedule of Section 5.6.1.B.

Bases

The environmental assessments, as defined in the FES-OL of 1972 (Section V.C.2) and the Supplement to the FES-OL of 1976 (Section 5.5.2.2) determined that impacts to the ichthyoplankton of Lake Frederic may result from the operation of Three Mile Island Nuclear Station. Impacts may occur due to the entrainment of fish eggs

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and larvae as a result of mechanical, thermal and biocidal effects. Operation entrainment studies of Unit 1 have indicated low numbers of larval fishes at the intake. Those which have been taken, however, have been represented by several important forage (shiners and darters) and recreational (catfishes, sunfishes, perch) species. The densities of larvae were higher at the intake than at the discharge and always higher at night than during the day for both far-field and entrainment samples. For the latter reason, far-field sampling will be undertaken from March to July, the period which encompasses the peak spawning season of the Lake Frederic fishes. The majority of fish larvae have been taken during May and June.

In local areas where there is a prolonged temperature shift due to thermal discharges, even if only a few degrees, there may be a shift in comparative abundance of species, with some species disappearing if they approach the limit of their temperature preferendum.

3.1.2.a.(1)(c) Fish

Specification

The ichthyofauna shall be sampled to detect and assess the significance of changes in species composition, relative abundance, seasonal and spatial distribution, condition, and diversity of species as related

to power station operation. Sampling shall be performed as per the Procedures Manual. Methods and materials approved for the implementation of this program are provided in the Procedures Manual.

Surveillance Requirement

This surveillance program shall commence at initial criticality of Unit 2 and continue for the life of the station or until approval for termination is obtained from NRC as per Section 5.6.3.C.

Sampling shall be conducted once per calendar month at approximately 30-day intervals.

Reporting Requirement

Data, program results, and interpretation of environmental impacts shall be reported as per the routine report schedule of Section 5.6.1.B. The findings of this program shall be reviewed by NRC after the receipt of the routine report covering the period of the second year of full power commercial operation of Unit 2. At that time the program and findings shall be assessed for their adequacy and possible modification.

Bases

The environmental assessments, as defined in the FES-OL of 1972 (Section V.C.2) and the Supplement to the FES-OL of 1976 (Section

5.2.2.1) determined that impacts to the fish populations of Lake Frederic may result from the operation of Three Mile Island Nuclear Station. Impacts may result due to impingement of adult and juvenile fishes and the entrainment of fish eggs and larvae. In order to assess the relative significance of these phenomena on the fish populations, this lake-wide sampling program will be performed. Additionally, several species support an active recreational fishery in Lake Frederic and might be subject to potential impaction - sunfish and catfish (several species each), rock bass, smallmouth bass, walleye, and possibly crappie and carp.

Operational impingement studies of Unit 1 have shown that the most frequently captured fish species were tassellated darter, channel catfish, spottail shiner, and spotfin shiner. The catfish is an important recreational species, while the darter, spottail shiner and catfish form important food items in the diets of several other recreational species (i.e., rock bass, smallmouth bass, walleye).

Some fish species may be attracted to the warm thermal discharge, particularly during the cooler seasons. A concentration of fishes could result in increased or altered predation, disease, or loss of condition. In local areas where there is a prolonged temperature shift, even if only a few degrees, there may be a shift in comparative abundance of species, with some species disappearing if they approach the limit of their temperature preferendum.

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3.1.2.a.(2) Impingement

Specification

Organisms shall be collected from the traveling screens to identify species and to determine the number and weight removed by impingement. A subsampling scheme approved for this program is provided in the Procedures Manual.

Organisms collected from the traveling screens shall be disposed of in a manner consistent with requirements of the U. S. Environmental Protection Agency and/or state regulatory agencies.

Surveillance Requirement

This surveillance program shall commence when Unit 2 begins commercial operation and continue until approval for termination has been obtained from the NRC as per Section 5.6.3.C.

Impinged organisms from each Unit shall be sampled concurrently for one continuous twenty-four hour period twice each month.

Reporting Requirement

Results of this study shall be submitted as per Section 5.6.1. The reports shall contain the following information for each unit: the date of the sample, the taxa collected, the number or estimated number impinged in 24 hours for each taxon and the weight (g) of each taxon,

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the number of pumps operating during each sample, and the inlet water temperature. A comparison between an impingement experience at Unit 1 versus Unit 2 shall be provided.

Bases

The magnitude of loss and the potential impact to the aquatic ecosystem in the vicinity of the power plant resulting from impingement of aquatic organisms on the traveling screens is not precisely known or determinable on a theoretical basis alone. Sampling or organisms collected on the traveling screens will ensure that a reasonable estimate of the organisms impinged in the intake structure will be identified and enumerated. This information when combined with the results of the far field biological surveillance program in the intake/receiving waters will provide the empirical basis on which to judge the impact of plant operation.

Impingement monitoring by the applicant has been conducted during the operation of Unit 1. Results to date of this study indicate that impingement losses due to operation of Unit 1 are minimal. Unit 2 utilizes both a separate intake structure and intake canal. Monitoring of impingement losses due to the combined operation of Units 1 and 2 will assure that losses associated with the operation of Unit 2 are no greater than those experienced at Unit 1.

Estimates of fish losses due to impingement, used in conjunction with fisheries studies conducted on the intake/receiving and estimates of losses due to entrainment, will allow an overall evaluation of impact sustained to the fishery by plant operation.

3.1.2.a.(3) Entrainment of Plankton, Eggs and Larval Forms

Specification

Ichthyoplankton (fish eggs and larvae) shall be collected at the intake structures to identify taxa and life stages and to estimate numbers and weight lost by cooling system entrainment. Methods and materials approved for this program are provided in the Procedures Manual.

Surveillance Requirement

This surveillance program shall commence when Unit 2 begins commercial operation and continue until approval for termination has been obtained in accordance with Section 5.6.3.C.

Entrained ichthyoplankton shall be collected semi-monthly during the period, April through July. On each sampling day, collections shall be stratified on the basis of day versus night variations.

Reporting Requirement

Results of this program shall be reported in accordance with Section 5.6.1. The reports shall include the following information: sampling date, time of day, species or taxon, life stage, number and weight, densities, and percent live.

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Bases

Adverse effects on local planktonic populations due to entrainment were not anticipated (FES, Units 1 and 2, December, 1972) and none have been detected during Unit 1 operation (FES Supplement, Unit 2, July, 1976). Continuation of phytoplankton and zooplankton monitoring during Unit 2 operation has been judged unnecessary (ibid, page 6-2).

The effects on local fish populations due to entrainment of ichthyoplankton are of higher concern, although no adverse impacts are expected. Predominant species in the fishery, deposit eggs on sheltered bottom areas. Larvae and early juveniles emigrating from such areas adjacent to the intake may be subjected to entrainment for the period of time that they remain in the lower water strata. All ichthyoplankton passed through the closed-cycle cooling system are presumably killed by the combined mechanical, chemical and thermal stresses.

Monitoring will provide data for assessing the level of ichthyoplankton entrainment relative to the ichthyoplankton populations in the river.

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3.1.2.b Terrestrial

3.1.2.b(1) Erosion Control Inspection

Specifications

Normal transmission line surveillance shall include examination for evidence of erosion. All areas within the specified corridor right of way showing evidences of abnormal erosion conditions related to transmission activities shall be identified and recorded. Upon identification of specific erosion damaged areas, initiation of corrective actions shall be undertaken and a record in the form of a field log shall be kept indicating the type of action employed and estimation of effective stabilization.

Reporting Requirement

A summary of the field inspection programs and corrective actions taken to control abnormal erosion conditions associated with transmission line maintenance activities shall be reported in accordance with the routine report schedule of Section 5.6.1.a. Field logs indicating locations of erosion damage and type of actions taken to rectify erosion problem areas and estimation of effective stabilization should be kept and be available on the site for a period of two years.

Bases

The environmental assessments as defined in the Final Supplement FES-OL of 1976 (Section 6.5) determined that periodic maintenance activities or severe weather may cause instances along the transmission line corridors where soil or slope stabilization will be necessary.

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Routine corridor surveillance techniques will identify erosion problem areas and coupled with appropriate erosion control steps will insure that such areas become stabilized.

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3.1.2.b(2) Transmission Rights of Way Management - Surveillance of Herbicide Applications

Specifications

The use of herbicides to control undesirable vegetation within the corridor rights-of-way associated with the station shall conform to the approved use of selected herbicides as registered by the Environmental Protection Agency and approved by state authorities and applied as directed by said authorities.

Surveillance Requirements

This surveillance program shall commence at the initial criticality of Unit 2 and continue for the life of the station. Surveillance shall be conducted only during the period of herbicide applications along the corridor right-of-way associated with the station. Inspections should confirm that restricted areas have not been sprayed, unauthorized releases have not taken place, and accidents such as spills have been documented and cleaned up if possible.

Reporting Requirements

The annual report will include a statement as to whether herbicides were used. In addition a brief description of the type(s), volume(s), concentration(s), manner and frequency of application will be included. Field logs summarizing dates of applications, weather conditions, location of applications, and rates of application should be kept and be available on site for a period of two years. A summary of the application and inspection programs will appear in the annual report as per routine report schedule of Section 5.6.1.a.

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Bases

The environmental assessment, as defined in the Supplement to the FES-OL of 1976 (Section 5.5.1) determined that herbicide usage along rights-of-way would result in acceptable impacts, if applied in accordance with Federal and state regulations. The objective of this monitoring program is to determine the type, volume, manner and method of herbicide applications to ensure environmental quality and provide safe reliable electrical service.

This information will provide surveillance information to the staff to ensure that herbicide applications conform to current Federal and state regulations and thereby, minimize environmental impact due to right-of-way maintenance procedures.

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3.1.2.b(3) Aerial Remote Sensing

Specifications

Vegetation communities of the site and vicinity shall be aerially photographed annually to detect and assess the significance of damage, or lack thereof, as related to cooling tower drift dispersions. Photography will be done by aerial overflight. Upon identification of specific drift damage impacts, the applicant shall submit for NRC review and possible modification, a detailed plan to ascertain the following:

(1) Correct functioning of all cooling tower drift eliminating systems;

(2) Specific plant response to stress resulting in either premature senescence and death or recovery;

(3) Specific actions to be initiated to replace or restore vegetative biota which, due to cooling tower drift, have undergone abnormal senescence resulting in death.

Methods and materials approved for implementation of this program are provided in the Procedure Manual.

Surveillance Requirements

This surveillance program shall commence at initial criticality of Unit 2 and shall be reviewed by NRC after a period of five years for possible modification or deletion as per Section 5.6.3.

Aerial photography will be conducted once per year during late summer or early fall.

Reporting Requirements

The results of the aerial photography drift surveillance program shall be summarized as per routine report schedule of Section 5.6.1.a. Representative photographs should be made available upon request of this staff. The findings of this program shall be reviewed by NRC after the receipt of each routine report.

Bases

The environmental assessments, as defined in the FES-OL of 1972 (Section V.C.1.a) and the Supplement to the FES-OL of 1976 (Section 5.5.1) determined that impacts to surrounding vegetative communities may result from the operation of Three Mile Island Nuclear Station cooling towers. Impacts may occur due to cooling tower drift deposition causing vegetative stress. Reconnaissance and aerial photographic inspection of biota in the drift field is the means recommended for detection of possible adverse effects of drift.

Such adverse effects may most often be associated with either episodic high level dosages of chlorine or chronic low level chlorine dosages. Aerial photography will monitor and record the presence or absence of vegetative effects due to cooling tower drift deposition.

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4.0 Special Surveillance and Study Activities

4.1 Residual Chlorine Surveillance Program

Specification

The licensee shall sample the plant discharge plume in the Susquehanna River to determine the spatial distribution of the total residual chlorine when the licensee initiates a discharge of free residual chlorine at the maximum level allowed by the NPDES Permit (i.e., 0.2 mg/l average free residual chlorine or 0.5 mg/l maximum free residual chlorine).

Surveillance Requirement

The licensee shall analyze the waters of the plant discharge plume for total residual chlorine and shall determine the location of the 0.2 mg/l, 0.1 mg/l and 0.05 mg/l total residual chlorine isopleths in the Susquehanna River. The surface area and volume of water within each isopleth shall also be determined. All analyses shall be conducted as allowed by the EPA Guidelines Establishing Test Procedures for the Analysis of Pollutants, 40 CFR 136.

This special surveillance program shall commence with the initiation of plant chlorine discharge at the maximum level allowed by the NPDES Permit. This special surveillance program shall terminate when the specified isopleths, areas and volumes have been determined for the operating conditions under which the maximum chlorination program is conducted.

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Reporting Requirement

The results of the surveillance conducted under this program shall be reported in accordance with Section 5.6.1.a. The results shall include the locations of the isopleths, the surface areas defined by each, the estimated volume of water within each isopleth, the method of analysis, the date of analysis, and the plant and river discharge flow rates.

Bases

In the Supplement to the Environmental Statement, Section 5.3.3, it was recognized that chlorination of plant systems at the level permitted by the NPDES Permit could lead to discharge of total residual chlorine values up to 3 times the measured values for free residual chlorine. These levels would exceed a recognized criterion for exposure of aquatic biota to residual chlorine. The staff FES analysis indicated that the residual chlorine levels in the discharge plume would be reduced to levels below the criterion within a short distance of the outfall. This program will provide the necessary information to quantify the portions of the Susquehanna River which will experience residual chlorine concentrations in excess of recommended levels.

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DRAFT
HBerkson:jd
11/1/76

4.2 Thermal Hydraulic Plume

Specification

The licensee shall sample the plant discharge plume in the Susquehanna River to identify and characterize the station discharge plume with respect to temperature. The data shall be collected at locations, depths, and frequencies specified in Section ___, (Procedures) appended to these ETS. These sampling locations, depths and frequencies described will provide for a patterned, three-dimensional definition of the plume.

Surveillance Requirement

The licensee shall prepare and submit to the NRC an interpretive analysis of the results of this study. This special surveillance program shall commence with the initiation of cooling system discharges and shall continue until completion of one year of full power commercial operation of Unit 2.

Reporting Requirement

The results of the surveillance conducted under this program shall be analyzed, interpreted and reported in accordance with Section 5.6.1.a. The results shall include the locations of the isotherms, the surface areas defined by each, the estimated volume of water within each isotherm, the methods, locations and dates of measurement, the rationale for the analysis and interpretation of the results, the plant and river discharge flow rates, and all other hydrological and meteorological data used in the analysis of significance.

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Bases

Section 5.5.2.3 of the Draft Supplement (6/76) determined that the thermal discharge mapping study of Unit 1 demonstrated that relatively little thermal effect on the Susquehanna River results from a operation of that Unit. The thermal plume resulting from operation Unit 2 in addition to Unit 1 should be mapped to verify the FES assessment that no adverse effects to Susquehanna River biota from thermal modifications would be caused by operation of the Three Mile Island Nuclear Station.

1564 153

DRAFT
HBerkson:jd
11/1/76

4.3 Hydraulic Effects

Specification

The licensee shall monitor the middle channel of the Susquehanna River in the vicinity of river water intake structures and cooling tower discharge structures to determine the extent of scouring or sedimentation of the river bed that is occurring as a result of operating the Three Mile Island Nuclear Station.

Surveillance Requirement

The licensee shall make depth soundings at the locations indicated in the appendix to these ETS stipulating sampling procedures. Soundings shall be made semi-annually; once following the spring runoff, and once prior to the heavy winter runoff season. This study shall continue until completion of two years of full power operation of Unit 2.

Reporting Requirement

An interpretive analysis of the results of the surveillance conducted under this program shall be reported in accordance with Section 5.6.1.a. The results shall include identification of the sounding locations, dates and times of soundings, the plant and river discharge flow rates and estimations of intake and discharge velocities.

Bases

Hydrographic surveys are required to insure that the intake channel is deep enough to maintain minimum submergence on the nuclear service pumps. In

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addition, Section III.D.1 of the FES (12/72) identifies discharge velocities of about 2.7 ft/sec with a possible maximum of 5.2 ft/sec. These velocities are capable of scouring portions of the Susquehanna River bed. The occurrence of this scouring should be verified and the significance of its extent assessed.

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5.0 Administrative Controls

Not included.

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3.1.2.a.(1)(a) Benthic Macroinvertebrates

The benthic macroinvertebrate population shall be monitored for: species composition and spatial distribution, standing crop biomass, and species diversity. Sampling shall be conducted at Stations 1 through 5 as described in Tables 3.1-1 and 3.1-2 and as illustrated in Figure 3.1-1. Samples shall be collected in quadruplicate with a 23 X 23 cm ponar grab with a sampling area of 529 cm^2 (0.56 ft^2). Samples shall be wet-sorted through a #30 standard sieve, preserved, and stored in a mixture of 10% formalin and Rose Bengal stain. Preserved samples shall be sorted, counted, and identified to the lowest possible taxon. Major groups of organisms shall be dried in a drying oven at 55°C for 24 hours, cooled in a desiccator, and weighed to the nearest 0.1 mg. Weights shall not be determined for individuals less than 0.1 mg and those retained for taxonomic purposes. Taxa shall be reported as numbers caught and biomass (dry weight in mgs) per m^2 of bottom. Data shall be analyzed statistically by means of diversity indices (Shannon's formula) and in index of similarity (species composition between stations).

Data and program results reported as per the routine report (Section 5.6.1.a) shall contain, but not be limited to: sampling date, station number, depth of the sample in meters, gear type used, substrate type (expressed in general terms), sample size (areal size sampled in m^2), species or taxon, number collected in the sample, biomass

expressed as grams by weight 1 m^2 for each indicated taxon in the sample.

Procedures Section

3.1.2.a.(1)(b) Ichthyoplankton

The ichthyoplankton shall be monitored for species composition, relative abundance, density, seasonal and spatial distribution. Sampling shall be conducted at night at Stations 1 through 13 as described in Tables 3.1-1 and 3.1-2 and as illustrated in Figure 3.1-4. Far-field sampling dates shall be coordinated with entrainment sampling. Samples shall be collected with a net or pump, whichever is more practical. The net shall be 0.5 m diameter and of 500μ mesh (No.0). It shall be towed in duplicate for four minutes below the surface and approximately 30 feet behind a boat proceeding upstream. Pump samples (400 gal., 1.5 m^2) shall be collected in duplicate with a Lindsay-Morrisson plankton pump supplied with a No. 10 mesh (158μ) plankton net. Specimens or representative subsamples shall be taken to the laboratory, sorted, preserved in _____, and identified to the lowest feasible taxon. Fish larvae shall be measured to the 0.1 mm.

Data and program results reported as per the routine report (Section 5.6.1.a) shall contain, but not be limited to: sampling date, station number, depth of the sample meters, species or taxon, life stage (model life stage of the specimens), and No./100 m^3

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(the estimated number of organisms per 100 cubic meters of water filtered or pumped).

3.1.2.a.(1)(c) Fish

Fish shall be monitored for species composition, relative abundance, seasonal and spatial distribution. Sampling shall be conducted at Stations 1 through 5 for trapnet, Stations 6 through 10 for seine, and Stations 1 through 11 for electrofishing as described in Tables 3.1-1 and 3.1-2 and as illustrated in Figures 3.1-2 and 3.1-3. A trapnet shall consist of a 3 X 50 ft. lead net and a 3 X 6 ft. metal frame box connected by two traps (4 - 2.5 ft. diameter hoops). The lead net and trapnet shall be 0.5 in. mesh. Trapnets shall be fished for a 24 hour period, checked, and reset for a second 24 hour period. Captured fishes shall be identified, measured, weighed and released in the field. A 10 X 4 ft., 1/8 inch mesh common seine will be fished in triplicate at each station. Captured fishes shall be preserved in 10% formalin, placed in water for one week to remove formalin, and stored in 40% isopropanol. Specimens shall be counted, identified to the lowest feasible taxon, and measured to within a 5 mm fork length interval. Specimens of a species which are within the same 5 mm interval in each collection shall be weighed together collectively to the nearest gram. Total and mean weights and condition factors shall be determined for the most common fish species ($\geq$10% total years catch for each year) in each 5 mm length group. Condition factor shall be computed as : $K = \frac{\text{Weight (gm)}}{\text{Length}^3\text{ (cm)}} \times 100$. Data shall be analyzed statistically by means of the Shannon-Weaver diversity index.

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Data and program results reported as per the routine report (Section 5.6.1.a) shall contain, but not be limited to: sampling date, station number, depth of the sample in meters, sampling gear type used, duration of sampling (minutes), species or taxon, number collected in the sample, maximum and minimum length in mm (the longest and shortest fish by species in the sample), model length(s) in mm by species, model wieght(s) in grams by species.

When large numbers of fish are captured which may be in excess of those required for proper analysis, a subsample shall be taken which is representative of the sample as a whole (by species, size classes, sex, etc.). The excess shall be returned. Any fishes captured which are positively field identified as a species recognized as threatened or endangered by either the State of Pennsylvania or the U. S. Department of the Interior shall be returned to the lake alive, if their retention is not necessary for analytical purposes.

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3.1.2.a.(2) Impingement

Materials

Mesh size of collection devices shall approximate that of the traveling screens.

Methods

Subsampling:

(a) If subsampling is necessary, each subsample should be composed of specimens taken throughout the 24 hour sampling period. At a minimum, one-fourth of each subsample shall be obtained from each of the following approximate four time periods: (1) six hours before sunset, (2) six hours after sunset, (3) six hours before sunrise, and (4) six hours after sunrise.

(b) If the sample from each unit is 50 kg or less, the number and total weight of individuals of each taxon shall be determined.

(c) If the sample from each unit exceeds 50 kg, the following subsampling scheme shall be employed:

	No. of subsamples of 50 kg each	
Weight of Sample in kg	Primary	Secondary
≥ 50 < 100	1	0
≥100 < 150	1	1
≥150 < 200	1	2
≥200 < 250	1	3
≥250	1	4

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(d) The number and total weight of individuals of each taxon shall be determined for the primary subsample prior to examination of the secondary subsample(s). Taxa with less than 30 specimens appearing in the primary subsample or occurring only in the secondary subsamples shall be designated as non-dominant taxa. The secondary subsamples shall be examined for specimens of non-dominant taxa. These specimens shall be counted and the total weight obtained for each taxon.

Extrapolation of the composition of the primary subsample to the total sample shall only be performed for the taxa in which more than 30 individuals were reported.

The numbers of individuals and total weight for each non-dominant taxon shall be computed for all subsamples and extrapolated to the sample based on the total (both primary and secondary) subsample weight. Total biomass and numbers of each taxon impinged shall, therefore, be estimated by either actual measurement or extrapolation from subsamples.

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3.1.2.a.(3) Entrainment of Plankton, Eggs and Larval Forms

Field and laboratory procedures for treatment of entrainment samples shall be comparable to those approved for far-field ichthyoplankton monitoring; see Procedures Manual Section 3.1.2.a.(1)(b). At least one identical gear type (pump or net) shall be used at both the intake and river stations.

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3.1.2.b(3) Aerial Remote Sensing

One of several aerial photographic techniques may be utilized.

- Natural and false color infared photography.
- Multispectral photography employing black and white infared film, employing four spectral bands (blue, green, red, and infared).

Selection of either or both of the above techniques should include the following parameters:

- study area around cooling towers should be relatively small (about 25 square kilometers)
- the scale for full coverage should be adequate to enable identification of vegetative damage over relatively small areas of terrain. Some circumstances may warrant inspection of photographs illustrating individual trees. Such scale should not exceed 1:6000.

Photographic interpretations will correlate data from simple ground truthing surveys and drift modelling with areas of stress and non-stress, as seen on the photographs in order to assure accuracy of photographs. Ground truthing will include a transect analyses through areas of maximum predicted drift deposition as well as any areas shown by photographic evidence to be experiencing stress. Impact on vegetation, if any, will be noted as to general characteristics and as to the type of symptoms on leaves and buds or general decline of plants. All general ground truthing data collected in the field will be gathered with specific intent for utility in the interpretation of the remote sensing imagery.

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Timing of aerial photography and ground truthing should be selected to coincide with periods of maximum predicted drift deposition damage, preferably from August 15 to September 15 meteorological conditions permitting.

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TABLE 3.1-1

SUMMARY OF NON-RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM FOR THREE MILE ISLAND NUCLEAR STATION

Sampling Program	Sampling Stations (Figures 3.1-1 through 3.1-4)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	Intake	Discharge
Benthos-Ponar Grab	M	M	M	M	M										
Fish															
Trapnet	M	M	M	M	M										
Seine						M	M	M	M	M					
Electrofishing	M	M	M	M	M	M	M	M	M	M	M				
Ichthyoplankton	W	W	W	W	W	W	W	W	W	W	W	W	W		
Impingement														I	
Entrainment														E	
Water Quality	M	M	M	M	M										

KEY:

M - monthly year round
W - weekly, March - July
I - monthly November - February; semi-monthly March - April and July - October; weekly May - June
E - semi-monthly March - July, diurnally

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TABLE 3.1-2

AQUATIC MONITORING PARAMETERS
AND SAMPLING LOCATIONS

Figure	Station	Code	Description
			Chemical, D.O., and Benthos Stations
3.1-1			
	1	TM-AQI-1A1	North end of Sand Beach Island, 75 m offshore. Water depth 0.6 - 2.0 m.
	2	TM-AQI-1A2	Southwest St. Johns Island, 15 m offshore. Water depth 1.0 - 2.0 m.
	3	TM-AQI-11A1	At TMI discharge 10 m downstream, 15 m offshore TMI. Water depth 1.0 - 2.0 m.
	4	TM-AQI-11A2	70 m downstream TMI discharge, 15 m offshore TMI. Water depth 0.6 - 2.0 m.
	5	TM-AQI-9B1	1,900 m downstream of the TMINS discharge, 15 m offshore TMI. Water depth 1.0 - 2.3 m.
			Trapnet and Seine Stations
3.1-2		Trapnet	
	1	TM-AQF-14A1	TMINS intakes.
	2	TM-AQF-1A3	Off southwest shore of St. Johns Island.
	3	TM-AQF-11A2	TMINS discharge.
	4	TM-AQF-11A3	200 m downstream from TMINS discharge.
	5	TM-AQF-9B2	100 m upstream for York Haven Dam.
		Seine	
	6	TM-AQF-1A2	Northwest St. Johns Island.
	7	TM-AQF-16A1	25 m upstream from TMI boat dock.
	8	TM-AQF-10A2	150 m downstream from TMINS discharge.
	9	TM-AQF-9A1	500 m upstream from York Haven Dam, or 1,500 m downstream from TMINS discharge.
	10	TM-AQF-9B3	2000 m downstream from TMINS discharge.

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TABLE 3.1-2 (CONTINUED)

Figure	Station	Code	Description
3.1-3			Electrofishing Stations
	1	TM-AQF-15B2	Along west shore of reservoir opposite Hill Island.
	2	TM-AQF-16B2 and 16B3	Along southeast and southwest shores of Fall Island.
	3	TM-AQF-15A1	Along northwest shore of Shelley Island.
	4	TM-AQF-15A2	Along northeast shore of Shelley Island.
	5	TM-AQF-16A2	Along northwest shore of TMI.
	6	TM-AQF-4A1	Along northeast shore of TMI downstream from north bridge.
	7	TM-AQF-10A3	Along west shore of TMI downstream from TMNS discharge.
	8	TM-AQF-11B1	Along west shore of reservoir upstream from Bashore Island.
	9	TM-AQF-10B3	Along southwest shore of Shelley Island.
	10	TM-AQF-10B1	Along southeast shore of Shelley Island.
	11	TM-AQF-9B5	Along southwest shore of TMI upstream from York Haven Dam.
3.1-4			Ichthyoplankton Stations
	1	TM-LF-14B1	Along west shore between Hill Island and the York County shore.
	2	TM-LF-15B1	Along east shore of Hill Island.
	3	TM-LF-1B1	Along east shore near the Tri County Marina.
	4	TM-LF-12B1	Along west shore near the mouth of Fishing Creek.
	5	TM-LF-12A1	Along west shore of Shelley Island.
	6	TM-LF-13A1	Along east shore of Shelley Island, opposite the TMNS intake structures.

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TABLE 3.1-2 (CONTINUED)

Figure	Station	Code	Description
3.1-4			Ichthyoplankton Stations (Continued)
	7	TM-LF-13A2	Along west shore of TMI near the Unit 1 and 2 intake structures.
	8	TM-LF-4A1	Along east shore of TMI.
	9	TM-LF-10B1	Along east shore of Bashore Island.
	10	TM-LF-10B2	Along southwest shore of Shelley Island.
	11	TM-LF-10B3	Along southeast shore of Shelley Island.
	12	TM-LF-9B1	Along southwest shore of TMI.
	13	TM-LF-11A1	Along west shore of TMI downstream of discharge.

BIOLOGICAL MONITORING SAMPLING IDENTIFICATION SYSTEM

VV-WWW-XXYZ: General Code for Identification of Type and Location of Sampling Location.

VV: Power Station Identification Code (the Three Mile Island code is TM)

WWW: Media Sampled

- AQI: Aquatic, Invertebrates
- AQF: Aquatic, Adult Fish
- LF: Ichthyoplankton
- NV: Vegetation Analysis
- PPT: Plant Pathology Transect

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XX: Angular Sector of Sampling Location

Sixteen sectors of 22-1/2 degrees each are centered about the reactor site. Sector 1 is divided equally by the due North axis and other sectors are numbered in a clockwise direction in the following manner: 2=NNE, 3=NE, 4=ENE, 5=E, 6=ESE, 7=SE, 8=SSE, 9=S, 10=SSW, 11=SW, 12=WSW, 13=W, 14=WNW, 15=NW, and 16=NNW.

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TABLE 3.1-2 (CONTINUED)

(: Radial Zone of Sampling Location (Radial Distance from Plant)

S: On-Site Location
A: 0-1 Mile Off-Site
B: 1-2 Miles Off-Site
C: 2-3 Miles Off-Site
D: 3-4 Miles Off-Site
E: 4-5 Miles Off-Site
F: 5-10 Miles Off-Site
G: 10-20 Miles Off-Site
H: >20 Miles Off-Site

Z: Station's Numerical Designation Within Each Sector and Zone Use 1, 2. ...

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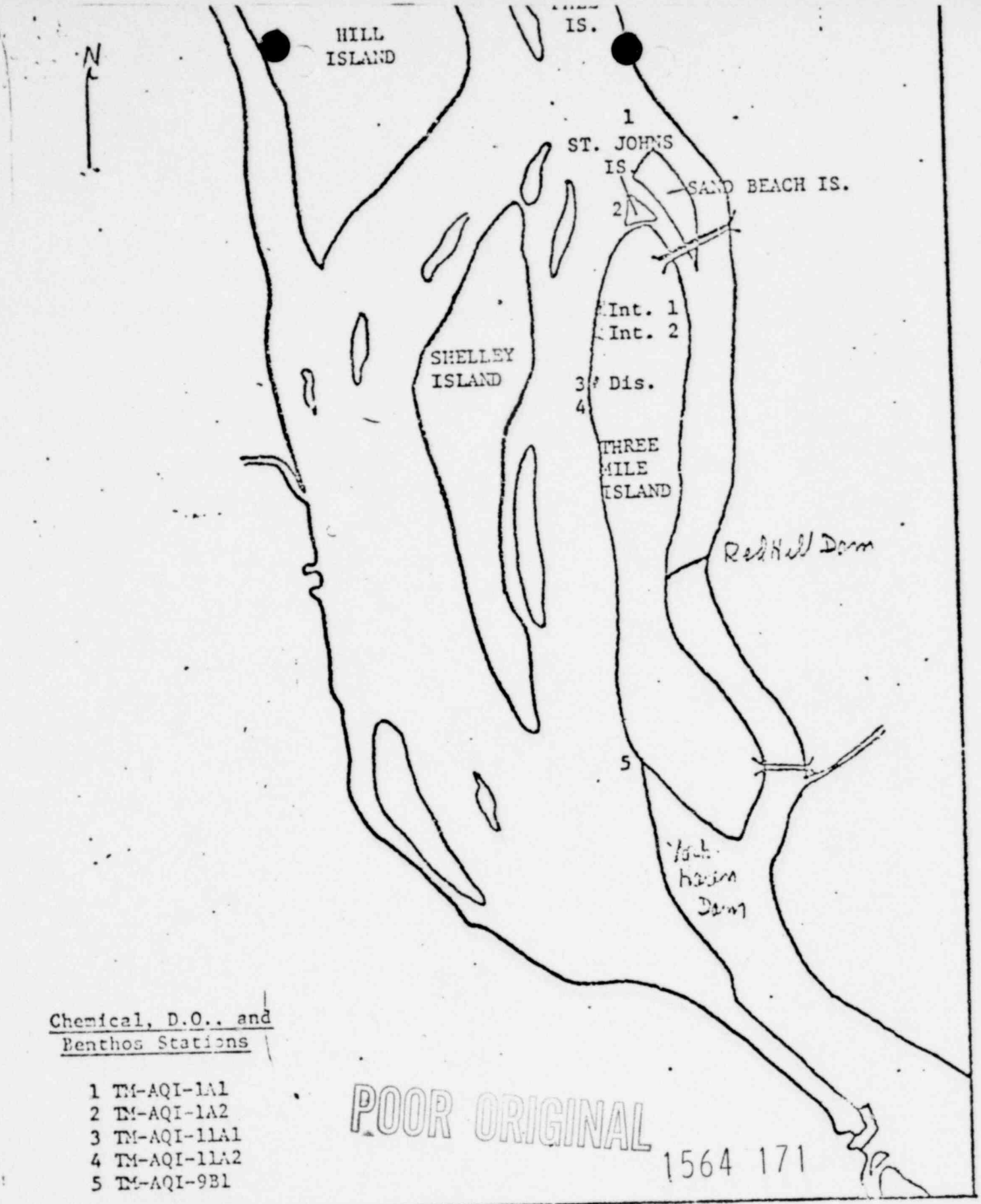

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FIGURE 3.1-1

LOCATION OF CHEMICAL, DISSOLVED OXYGEN, AND BENTHIC MACROINVERTEBRATE STATIONS IN THE VICINITY OF TMINS

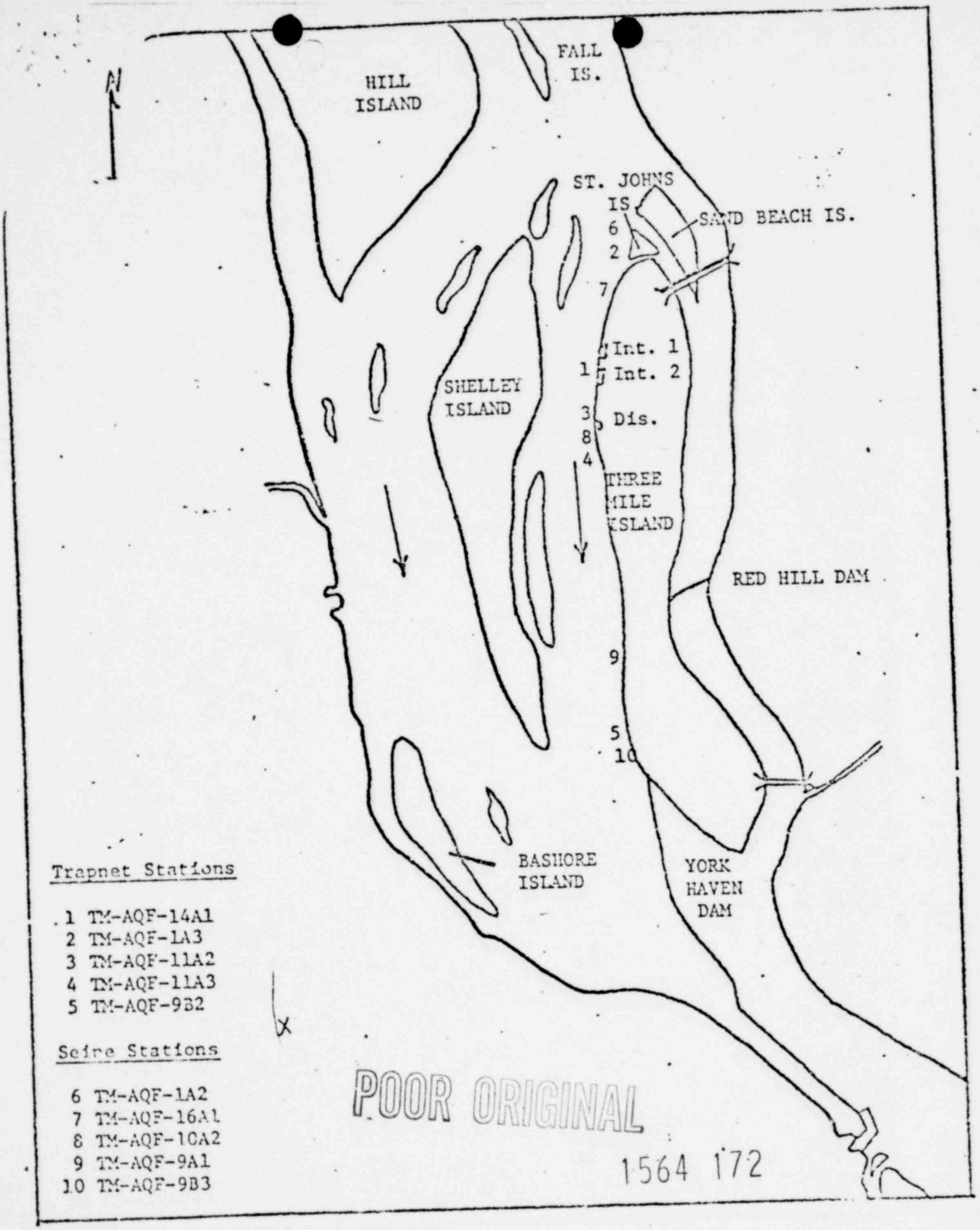

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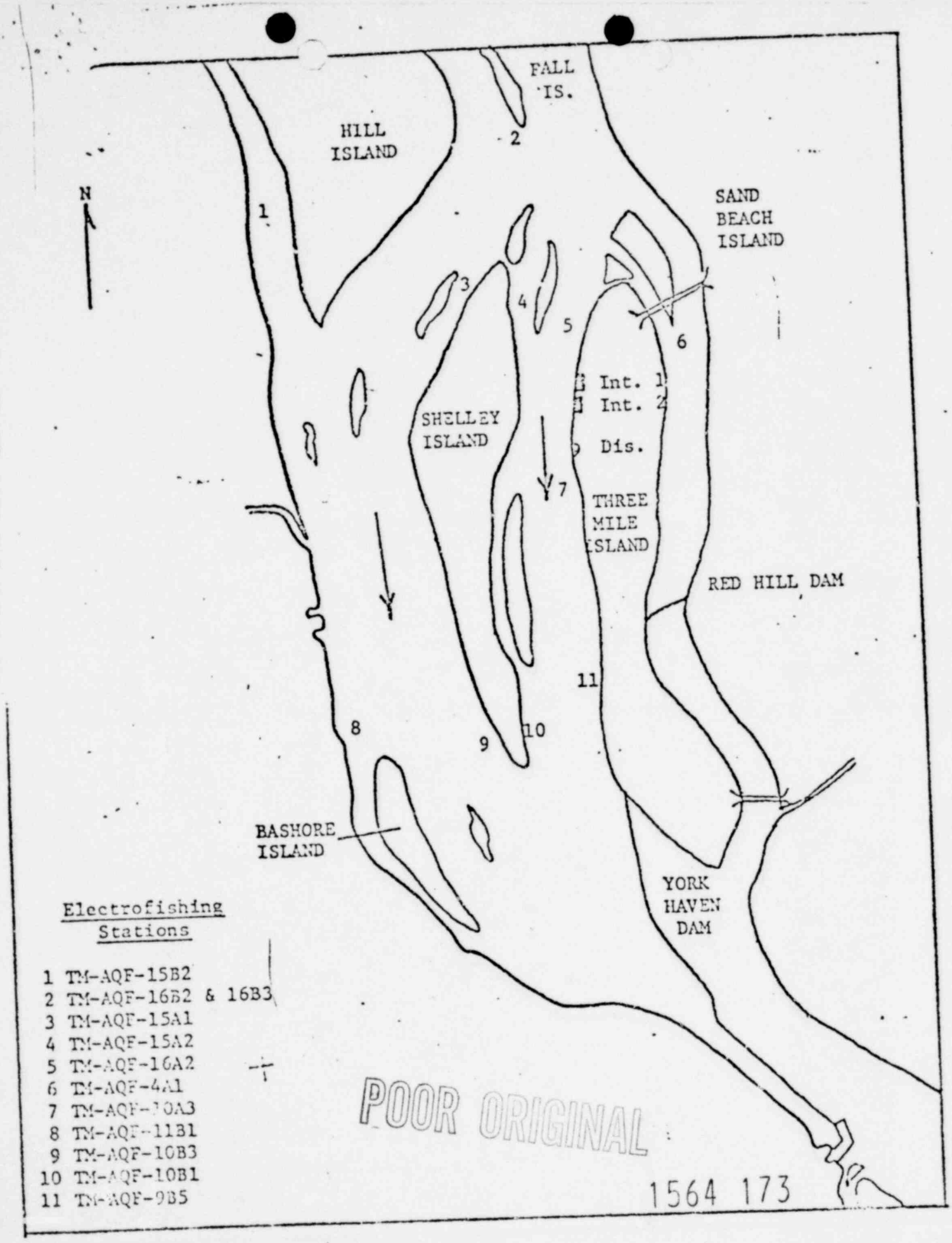
FIGURE 3.1-2

LOCATION OF TRAPNET AND SEINE



POOR ORIGINAL

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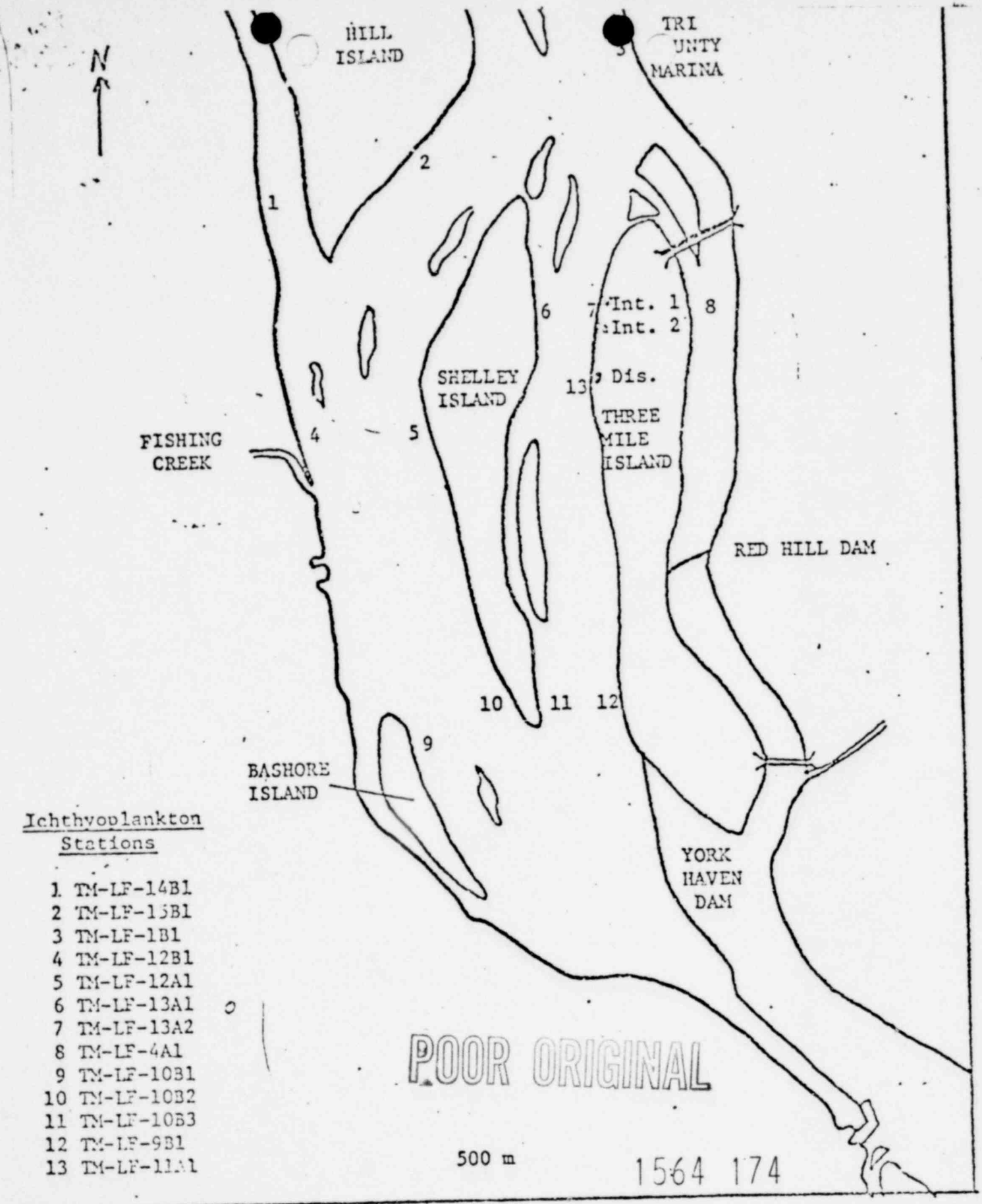
FIGURE 3.1-3

LOCATION OF ELECTROFISHING STATIONS



POOR ORIGINAL

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FIGURE 3.1-4

LOCATION OF ICHTHYOPLANKTON STATIONS IN THE VICINITY OF TMINS